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ABSTRACT

The comprehensive system of external examinations in Scotland has undergone major changes. The external examination system has been expanded to cover the entire secondary school curriculum. The examinations will now be administered to all students. The "continuum" model of criterion referenced tests has been adopted for the school leaving examination in Scotland. The process for implementing the revisions of the external examination program is described. In the future the examination program will be expanded. Six grades (grades 2, 3, 4, 5, 6, and 12) will be assessed in each aspect of the curriculum. A consequence of the external examination system is that it often determines the curriculum to a certain extent. Teachers of various subjects in the curriculum are anxious to have their subject areas assessed by these examinations. The system requires further research investigation. (DWH)

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# RECENT DEVELOPMENTS in ASSESSMENT and EXAMINATION PROCEDURES: AN INTERNATIONAL PERSPECTIVE - CHANGE in SCOTLAND

Dr. W. B. Dockrell

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# RECENT DEVELOPMENTS IN ASSESSMENT AND EXAMINATION PROCEDURES: An International Perspective - Change in Scotland

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## I. INTRODUCTION

Scotland came late to a system of external examinations. It was not until 1888 that the Scottish Leaving Certificate was established. The Board of Regents in New York had published syllabuses and conducted examinations nearly ten years earlier. In England comparable examinations had been established 30 years earlier still by Oxford University and by Cambridge University. All of these examinations were specifically for high schools. This history is relevant to our general discussion because these early examinations were established for all the purposes that are now advanced to justify their continuance in Britain or their extension in the United States.

The Board of Regents established examinations in New York, "for the purpose of measuring the schools and establishing proper standards of scholarship" and to "furnish a suitable standard for graduation from academies ... and of admission to the several colleges of the state". (Kandel 1936, p.37) The purpose of the early English examination has an even more familiar ring. There the intent was to establish "examination systems" which both introduced new subjects and raised academic standards by competition". (Montgomery 1965, p.44) The aims in Scotland were somewhat similar. One was to bring about a uniform standard in schools. A second was to provide a definite purpose and value and a third was to afford "satisfactory evidence of scholarship (which, might be accepted in lieu of an examination ... by various professional societies and be a passport into the senior classes of the universities". (Roxburgh 1971, p.147) There is a remarkable similarity of purposes. All three were concerned with standards of scholarships. All three were concerned with the curriculum and two were concerned with college entrance. Those are concerns which we have to do.

## II. THE PRESENT SYSTEM

Scotland may have been late coming to external examinations but has subsequently embraced them with enthusiasm. The current system is comprehensive. There are externally devised curricula and examinations which are externally set and externally marked at the end of compulsory schooling. It is performance in these examinations that is the usual criterion for admission to universities and colleges in the States and therefore, I assume the equivalent of Grade 12. In 1983, 74% of all school leavers achieved at least a minimal pass in at least one subject. 41% reached the standard for admission to university in the US. (Scottish Education Department 1948a). Many, if not all, of the quarter or so of the age group who failed to obtain even a single pass will have followed courses which were designed to prepare them for those examinations. During at least the last two years of schooling the

examinations determine the curriculum for most pupils in most aspects of the curriculum.

Beyond this level youngsters fall into four groups. There are those who continue with a broad academic education which is the basis for the American liberal arts tradition. (After the War of Independence, American education like the American church was influenced by Scottish rather than by English practice). Virtually all these students were full-time. These courses also have an externally devised curriculum and external examinations. In 1983 33% of the age group obtained some passes at this level, slightly more girls than boys. (SED 1984a). The nearest American analogue to this programme is, I think, the Advanced Placement Examination. The second option for youngsters is to pursue a programme of specialised technical or business education at a level which is taken to be the equivalent of the academic programme and has similar status and entrance requirements. These programmes are offered almost exclusively in what we call Further Education Colleges. Their nearest analogue in the US is, I think, the Community or Junior College. About 11% of the age group take these courses on a full-time basis. (SED 1982, Pollock and Nicolson, 1981) A further 5 - 10% of the age group enter these courses on a part-time basis, predominantly by what we call "day release", i.e. employers are legally required to release young people on full pay for one day a week to take these courses. These programmes too have externally devised curricula and externally marked examinations.

The third option for young people to pursue vocational courses at a lower level, what in Britain we usually called "craft courses". These include courses in office skills, courses for electricians, for the building trades, for automotive servicing, for catering and other occupations at a comparable level. Nearly always these include training provided by an employer and education on a part-time basis provided in the further education colleges. 10 - 15% of the age group take such courses. These are overwhelmingly males so that 20% or so of the male group are following such courses and a small proportion of the females. Again, the educational component of these courses consists of externally determined curricula externally examined.

The rest of the age group do not pursue any formal programme of education, though some return at a later stage.

For the first three groups covering about 65% of the age group, their education is dominated, if not exclusively determined, by a system of externally designed curricula externally examined. There has been criticism of the role of external examinations since they were first established, particularly of the extent to which they restrict teacher initiative and limit the scope of students learning. No school or college is required to enter its students for these examinations. No youngster is compelled to sit them. Nevertheless they are virtually universal.

The examination at the end of compulsory schooling fulfills the functions of the public examination I referred to at the beginning. It is the gateway to the next stage, at least as far as the liberal arts and technical courses are concerned. It is the entrance requirement.

Young people who do not obtain these qualifications are not admitted. It is too traditionally the requirements for bank clerks, office work and similar occupations. Even those young people who do not take college programmes will be expected to have obtained passes in the High School Diploma. In practice however, since they are usually employed before the examination results are available it is the teachers' estimate of performance which is the crucial factor (Hart and Small 1981).

Much more significant are the other two roles of the public examinations. Clearly the external examinations maintain common standards. There is no question about the meaning of a high school diploma from an inner city or a suburban school. A youngster with a given level of performance recorded on his certificate has reached the same standard whether his school is in Hyde Park or Oak Park. Students and schools know how successful they have been in meeting the common standard. The examinations too fulfill their other purpose. They determine the curriculum for, in practice the schools offer the courses and the external examination assesses. What is tested is what is taught.

## III. RECENT CHANGES

The system that I have described above is now undergoing substantial revision, though in different ways for the different age levels.

### a. High School Diploma

What are seen from the Scottish perspective as being revolutionary changes are being introduced (Scottish Information Office 1984). First the examination system is being extended to cover all aspects of schooling for all pupils. In the past virtually all pupils will have taken some courses in, for examples the aesthetic area but only a minority did so for external examinations. Now all pupils will be taking courses in Music, Art or Drama for external examination. The same applies to Physical Education, Religious Education and other areas. The whole curriculum is to be covered by external examinations.

Up to this point approximately a quarter of the age group have escaped the examiners net altogether. Not in the future. In future all students will take examinations which have been extended in difficulty or rather in ease, to cover the performance of the full age group.

The system will in future, cover all students, in all aspects of the curriculum.

Modifications in the system are proposed. There will be at least in some subjects, at some levels of difficulty, a teacher devised element in the curriculum which must be submitted to the Examination Board for approval. There will too be an element of teacher assessment which will be scaled by the Examination Board.

For this audience the most significant aspect of change is perhaps the introduction of criterion-referencing. Meskauskas (1976) identified different models for standard setting in criterion-referenced testing.

He differentiated between "continuum" models and "state" models. It is a continuum model which has been adopted for the school leaving examination in Scotland. It is assumed that there is a continuously distributed level of competence or set of competences which can be identified at several points on the continuum. The phrase used in Scotland is "grade-related criteria".

Six grades are to be identified and assessed in each aspect of the curriculum. For each grade there are criteria defining both domain and level in general terms and more specific criteria which are intended to provide guidance to teachers in making their assessments. Table 1 is an example of "summary grade-related criteria". Table 2 is an example of "extended grade-related criteria", both as they relate to "knowing and understanding" in the Science curriculum. In some subject areas there are too exemplars or models of performance at different grade levels where it was felt it was easier to show than to describe.

b. Further Education

There are too extensive changes in the system beyond the high school diploma for those pursuing business, technical or trades courses (SED 1984b). The first change has been to end the system of defined and prescribed programmes and indeed of courses within programmes and to replace them all with modules of equal length if not equal difficulty.

Table 3 is an example of a "module descriptor".

In each case the entry requirements, the learning outcomes, content and the assessment procedures are defined. There are also suggested learning and teaching approaches. Assessment is the responsibility of the teacher.

The assessment model is a "state" model of criterion-referencing. That is, it is a matter of all or none achievement of the specified domains. The assessment comprises several sub-tests, each covering a tightly defined skill area.

The second change is to allow students to choose specific modules rather to follow predetermined programmes.

In theory at least students will now have responsibility for deciding their own programmes.

## IV. REASONS FOR CHANGE

a. High School Diploma (Standard Grade)

The major reason for changing the school leaving examination is that it was designed as a minority examination at a time when only 30% or so of

youngsters remained at school to complete the programme. In the 1970's the law was changed to require all youngsters to remain at school. The schools therefore had a curriculum and examination system which was designed for an elite which they had to adapt to the needs of the majority. Hence there was a need for new curricula and in Scotland that implied new examinations. At first there were "certificate" and "non-certificate" students following quite different programmes. The distinction broke down until eventually most students were including some certificate courses and some non-certificate courses in their programme. The term "non-certificate" pupil did become pejorative but at least it was an improvement on the term that used to be used which was "modified" pupils, for pupils who were following modified programmes.

When the review was first instituted over ten years ago, the Committee carrying it out was deliberately constituted to include some experts in the field of assessment. It was they who introduced notions like criterion-referenced testing and formative assessment, both of which have become dominant in Scottish thinking about assessment since then. It was accepted that the system could not simply be extended but had to be radically revised to take account of current thinking in assessment.

b. Further Education (Action Plan)

The changes in this area were brought about by rather different factors. One was a wide-spread concern about technical and vocational education in Britain in general. There is a wide-spread belief that Britain's poor economic performance is attributable in part to its educational system and particularly to technical and vocational education and training. There are wide-spread pressures for change from outside the system.

These might have been resisted but for the collapse of the system in the recent recession. The major characteristic of the recession in Britain was the dramatic decline in the traditional skill based industries, like engineering and construction and their replacement to some degree by new occupations in information technology and the service areas, where there was as yet little provision for education and training.

British industry cut back immediately and dramatically in its training programme. Many of the 25% or so of the age group who had been following further education programmes at both of the levels I referred to above were no longer employed and so were not taking courses at all. The colleges therefore saw a dramatic fall in their enrolment and were open to pressures for revision.

There were two characteristics of the system which were thought to be in need of change. One of them was its complexity. Youngsters enrolled in one of the miriad programmes prescribed by the examining bodies. Youngsters were rarely aware of the range of choice that was available to them and simply took the programme that their employer prescribed, even if it was not in accord with their own interests.

The second characteristic of this programme was its rigidity. Once a youngster was embarked on a programme there was no possibility of change. If he left it he returned to the beginning. There was no arrangement for transfer or credit. A youngster who had started a course to be an electrical engineer and taken a considerable amount of Mathematics and decided that instead he preferred Accountancy which also required Mathematics had to start at the beginning even though there might be much common ground between the two programmes. There was therefore great scope for simplification and for freeing up the system.

The situation that I have described applied to a very great extent in England as well as in Scotland. There has as yet been no change in England comparable to that which has already taken place in Scotland. One of the reasons, in my opinion, is that a particular able and energetic public servant in Scotland was given responsibility for this aspect of education. He saw what changes he thought should be made and seized the opportunity to ensure that the changes were made. That kind of change is not possible in the larger and more complex English setting.

## IV. IMPLEMENTING CHANGE

### a. High School Diploma (Standard Grade)

The need for change was first recognised nearly 15 years ago. The first step was to set up a Committee which deliberated for four or five years and produced a series of recommendations. These recommendations were, in traditional style, put out for comment and eventually the Government decided to take action.

The first step in implementing the proposals was to establish Working Parties whose task it was to rough out curricula and examination procedures in designated areas of the curriculum. Their task was to outline the kind of curriculum and assessment that might be appropriate in their subject. They had research and development staff attached to the committees on a full-time basis.

The first step in translating these general ideas into practice took place in "first line pilot" schools where the staffs were involved in the development of materials in designated parts of the subject areas, so that in Mathematics a number of schools were given responsibility for developing materials as they related to a part of, the Mathematics curriculum. This work was supported by the research and development staff. These materials were brought together and revised to make a coherent whole.

The next step was to try them out in "second line pilot" schools which received sets of materials to try out as a basis for later revision. The final outcome was a set of revised materials for teachers to use and models for them to adopt.

In Scottish terms this was as unprecedented exercise. While the actual resources might seem modest in American terms, in proportion to the

size of the country it was a massive effort. It included substantial research projects directed at specific aspects of the development programme. In rough ratios a comparable US effort would cost $500,000,000 per annum.

In addition, there as been an extensive programme of in-service education for all secondary school teachers. The Secretary of State has authorised the closing of secondary schools for ten days in an academic year to allow teachers to take part in in-service education in connection with the new programmes.

It has been a carefully planned, well-resourced programme.

b. Further Education (Action Plan)

The changes in the further education sector have been in striking contrast. Within a year the modules were written, largely on a part-time basis by existing college staffs though again with the support of some full-time research and development staff. They were independently reviewed. They were then revised and have now been implemented. The whole process took well under one year and additional expenditure was minimal.

## VI. PROBLEMS

Both programmes are in the early stages. The school leaving examination programme is a two-year programme which is now half-way through its first year so that the first cohort will not take the examination until 1986. The further education programme is half-way through its first year.

No formal evaluation of either programme has yet been commissioned. We have submitted a proposal for a study of the school leaving examination and are hopeful that it will be funded though perhaps not in the immediate future.

One problem that has begun to emerge is the difficulty of defining grade-related criteria in absolute form. There is a great temptation to use descriptions which are in effect less and more so that in the criteria for Science in Table 1 there is the use of the word "thorough" to indicate further along the continuum rather than defining it in any absolute way.

A second problem arises when the criteria are defined in terms of process rather than content. For instance in Table 1 grade-related criterion 4.3 talks of "understanding of application of scientific facts and ideas". Some teachers are finding that there is an interaction between process and the content or context. "Understanding" can be demonstrated in one context but not in another. A problem not unlike "decalages" in Piagetian theory. A more general concern is that voiced by one headteacher, "With all the national developments our freedom to do what we want ... has gone" (SCRE 1985).

There has been no evaluation either of the changes in assessment in further education though, we have recently instituted a pilot project. It is however, too early for us to have any substantive findings.

Among the questions that have arisen are the extent to which students are actually pursuing their newfound freedom to construct their own programmes or are in practice following the old programmes as though they were still prescribed. A second problem arises from the structure of the system. What does a youngster do if he fails a module? In some cases he would have to wait until next year because it is not offered again during the current academic year. This clearly puts particular pressure on teachers when it comes to assessment.

## VII. CONCLUSIONS

The changes in the Scottish system are too recent for us to know how teachers will react to their new role. In the case of the school leaving examination it is largely an extension of existing practice and it seems to be generally accepted. There is competition from teachers to ensure that their subject is included in the assessment system and a touching, if naive, faith in the merits of external examination.

We do not yet know how students will react to the inducement of the examination. Will the new demands give them a target which they will strive to reach? There are many researchable questions and we hope to research at least some of them.

Cost is a constant concern but of course it is a question of cost to whom. In Scotland as in the rest of Britain, examination costs are borne by the education authority and not by the central Government which is pushing forward the change. In any case the costs for extending a system are considerably less than the costs of introducing one. In further education the formal costs might indeed be reduced since more of the work has been off-loaded on to the teachers as part of their normal responsibilities.

From the point of view of NCME the most significant feature of the Scottish developments is the fascinating laboratory that is provided for the study of the introduction of criterion-referencing following two alternative models on such a substantial scale. It would, I think be a professional tragedy if we were not able to study these effects closely and if it were not possible for researchers to report their findings to you on some future occasion.

## VIII. POSTSCRIPT

We were not asked to comment on the relevance of our practices to the position in the United States. Perhaps that is just as well since an intimate knowledge of an educational system is necessary before sensible recommendations can be made. However, I think it may be worth raising some issues.

Is the external examination the best way of reaching the three objectives I referred to at the beginning of the paper? As far as admission to tertiary education is concerned the evidence seems to be that neither our system of attainment tests nor your system of aptitude tests correlates particularly highly with success in tertiary education. The correlations are in general low with a mean of about .25. There is no evidence of consistent differences between the two approaches.

Setting standards is important. Teachers need yardsticks which will help them to appreciate how the standards of their own students compare with those in other classes and schools. The more general the measure of attainment the less valuable it is for assessing performance in any particular curriculum. The closer the match between the test and the curriculum the more appropriate it is. The external examination has an obvious advantage here since it defines the curriculum. You might well want to consider however, whether these benefits justify the cost of establishing and maintaining an examination system, the cost in teacher time and effort in preparation for examinations and the effects on the curriculum. It may well be that targets can be set and comparisons made in some equally effective but less expensive way.

The considerable stress on individuals produced by the external examination system is justified in our context by the alleged benefits to the individuals concerned, e.g. admission to tertiary education or obtaining employment. If however, the objectives can be obtained in some other less stressful way it is hard to justify the pressure on these individuals on the grounds of benefit to the educational system as a whole. An external examination system has to have personal significance if it is to be taken seriously by teachers and students alike.

The most striking consequence of the external examination system is the extent to which it determines the curriculum. From the beginning there were arguments in Britain about the deleterious effects of the external examination system, both in narrowing the curriculum as a whole, by placing emphasis on "examinable" subjects and by placing emphasis within each subject on that which is examined. We have had from time to time reports on the secondary school curriculum which have emphasised the importance of the "non-examination" aspects of schooling, including the social and moral aspects of education, physical education, sports and outdoor education and aesthetic education. The pressure where education is dominated by external examinations is to include performance in each of these areas in the examination system. The paper on Sweden which we did not hear would no doubt have pointed out that their graduation from high school is based on an aggregate which includes the abilities to do push-ups and to sing in tune. It is this aggregate which determines admission to tertiary education and to particular programmes. The Swedes say that it is possible "to sing your way into engineering", by getting a high mark in music which counts equally with performance in Physics or Mathematics. That is the direction which we are moving in Scotland. Do you want to require that all high school students can meet a specified level of performance in running, jumping, singing, drawing, knowledge of

religion and ethical codes or do you think these matters are better handled in another way?

The narrowing within subjects has traditionally been acute. It is easier to measure reliably the knowledge of facts or the ability to reach pre-determined standards of performance in skill areas than it has been to measure originality. What are the objectives of teaching History, English or indeed Science and can they be successfully measured by external examinations? In the past we have had considerable doubts about this. As you can see from the tables that I presented we are working hard to overcome some of these problems by assessing not mastery of content but the understanding and application of principles. I personally believe that the re-examination of what it is we are trying to teach, how we are trying to teach it and how we know whether we have succeeded in teaching it has been wholly beneficial to the Scottish educational system. Does that valuable re-examination require an external examination system or it could have been achieved equally effectively without the stick and carrot of external examinations?

There is one final technical point which may be of interest to you, that is the generalisability of examination results. Is the same student performance likely to be given the same grade by different examiners? Is student performance on one occasion likely to generalise to performance on the same tasks on another occasion? Is performance on the set of tasks included in the examination likely to generalise to performance on other comparable tasks? Does performance on the tasks in the examination generalise to the objectives of the curriculum as a whole? I have already pointed out that performance in an external examination does not generalise particularly well to performance in tertiary education or indeed in employment. The answers to these questions are varied and complex and I will not attempt to summarise the research findings. I will simply point out that they are a matter of some concern and controversy in Britain and that before adopting a comparable system you would be well advised to look carefully at the British evidence on these matters.

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TABLE 1

Knowledge and Understanding - Summary GRC

Grade 2

With reference to all of the objectives of the Science Course, the candidate has shown a thorough knowledge and understanding of scientific facts and ideas relevant to society and has applied them in situations new to the candidate.

Grade 3

With reference to all of the objectives of the Science Course, the candidate has shown a thorough knowledge and understanding of scientific facts and ideas relevant to society and has applied them in situations related to the course content.

Grade 4

With reference to all of the objectives of the Science Course, the candidate has shown a knowledge and understanding of scientific facts and ideas relevant to society and has applied them in situations related to the course content.

Grade 5

With reference to the Foundation objectives of the Science Course, the candidate has shown a thorough knowledge and understanding of scientific facts and ideas relevant to society and has applied them in situations related to the course content.

Grade 6

With reference to the Foundation objectives of the Science Course, the candidate has shown a knowledge and understanding of scientific facts and ideas relevant to society and has applied them in situations studied in the course.

TABLE 2

Knowledge and Understanding - Extended CRC

| COURSE OBJECTIVES | Grade 6 | Grade 5 | Grade 4 | Grade 3 | Grade 2 |
|---|---|---|---|---|---|
| | The candidate has demonstrated: | In addition, the candidate has demonstrated: | In addition, the candidate has demonstrated: | In addition, the candidate has demonstrated: | In addition, the candidate has demonstrated |
| A(i) | 6.1<br>knowledge of scientific facts, ideas and their applications in society as defined by the specific objectives of the course (Foundation specific objectives); | 5.1<br>thorough knowledge of scientific facts, ideas and their applications in society as defined by the specific objectives of the course (Foundation specific objectives); | 4.1<br>knowledge of scientific facts, ideas and applications in society as defined by the specific objectives of the course (Foundation and General specific objectives); | 3.1<br>thorough knowledge of scientific facts, ideas and applications in society as defined by the specific objectives of the course (Foundation and General specific objectives); | |
| | 6.2<br>understanding of situations involving one idea at a time drawn from the specific objectives of the course (Foundation specific objectives); | 5.2<br>understanding of situations involving more than one idea at a time drawn from the specific objectives of the course (Foundation specific objectives); | 4.2<br>understanding of situations involving more than one idea at a time drawn from the specific objectives of the course (Foundation and General specific objectives); | 3.2<br>thorough understanding of situations involving more than one idea at a time drawn from the specific objectives of the course (Foundation and General specific objectives). | |
| A(ii) | 6.3<br>understanding of applications of scientific facts and ideas in familiar situations as defined by the specific objectives of the course (Foundation specific objectives). | 5.3<br>understanding of applications of scientific facts and ideas in situations related to those defined by the specific objectives of the course (Foundation specific objectives). | 4.3<br>understanding of applications of scientific facts and ideas in situations related to those defined by the specific objectives of the course (Foundation and General specific objectives). | | 2.3<br>understanding of applications of scientific facts and ideas in unfamiliar situations. |



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TABLE 3

SCOTTISH EDUCATION DEPARTMENT
New St Andrew's House Edinburgh EH1 3SY
(Tel. 031-556-8400)

## NATIONAL CERTIFICATE MODULE DESCRIPTOR

| | |
|---|---|
| Ref No./Date | 08003 Published Edition Spring 1985 |
| Title | AN INTRODUCTION TO CROPS AND SOILS |
| Type and Purpose | A general module(1/2) concerned with the physical characteristics of the soil and how these affect the crops grown and the type of farming. |
| Preferred Entry Level | No formal entry qualifications. |
| Learning Outcomes | The student should:<br>1. identify the common crops grown locally;<br>2. identify products used on the farm that are produced from farm-grown crops;<br>3. know the different habits of growth of grass and broadleaved plants;<br>4. identify heavy, loam and light soil types and indicate their key field characteristics;<br>5. know the effects that soil type, altitude, aspect, slope and climate have on the type of farming practised. |
| Content/ Context | Corresponding to the Learning Outcome:<br>1. crops are likely to include the cereals - wheat, barley and oats; rotation grass and rough grazing, clover, swedes and any other crop of local importance.<br>All the crops should be seen at seed, seedling, vegetative and flowering stages.<br>2. examples should include hay, silage, straw; rolled, ground and whole barley and oats; sugarbeet pulp; wet and dried grains.<br>3. annual, and perennial forms; taproot and fibrous root systems; tillering habit of grass-like plants; flowering habits and differences between crops; plant organs for food storage.<br>4. soil type recognition by feel; |

effects of soil type on water holding capacity;
- drought in summer;
- poaching by stock or machinery;
- ease of cultivation;
- timing of cultivation.

5. land capability grades;
reasons for downgrading - wetness;
- gradient;
climate;
soil limitations;
erosion suspectability.

land grades to be related to types of farming practised.

---

**Suggested Learning and Teaching Approaches**

Most of the work in this module should be undertaken on farm visits. If possible visits should be made to typical commercial units

- a hill farm;
- a marginal land farm;
- a dairy farm;
- a cropping farm with cereals and potatoes.

Visits should be preceded by the identification of the farm on the Ordnance Survey Map and on the Land Capability map. The grade of land should be ascertained. This grading should then be related to the crops grown on the farm, the state of the soil and the animals kept.

Soil sampling with an auger is a useful aid.

As much of the knowledge content of Learning Outcomes 1, 2 and 3 should be covered on farm visits as possible. Supplement with laboratory demonstration where required.

---

**Assessment Procedures**

Relating to the Learning Outcomes:

Learning Outcome 1
Practical Identification Test
The student identifies all of the following:

| | | |
|---|---|---|
| 1. | Ley | in field |
| 2. | Permanent pasture | |
| 3. | Rough grazing | |
| 4. | General grass seeds mixture | |
| 5. | Wheat | seed and at inflorescence |
| 6. | Barley | |
| 7. | Oats | |

| | | | |
|---|---|---|---|
| 8. | Potatoes | - | tuber and growing crop |
| 9. | Swedes/Turnips | - | Brassica seed |
| | | - | Brassica seedling |
| | | - | pre harvest crop |
| 10. | Clover | - | seed and vegetative stage |
| 11. | Another crop | - | any two stages (100%) |

Learning Outcome 2
Practical Identification Test
The student identifies the following:

Rolled barley

Rolled oats

Ground cereals

Hay

Silage

Straw

Wet grains

Dry grains

Sugar beet pulp (100%)

Learning Outcome 3
Written Exercise/Practical Identification Test.

(i) The student identifies tap rooted fibrous rooted plants and tillers from samples provided.

(ii) On a unlabelled diagram of a monocotyledonous plant, the student labels:

flower, leaf, stem, tiller, rhizome root.

(iii) Short answer questions (multiple choice) testing knowledge of:

(a) plant storage in terms of:

seed, tuber, root, stem, leaf

(b) annual and biennial plants by stating

4 annuals used as farm crops
2 biennial used as farm crops
(100%)

Learning Outcome 4

Practical Identification Test.

From four samples of soil, the student must identify two correctly and from those identified indicate five characteristics for each soil either by oral or written means from one of the following:

water holding capacity

size of particle

earliness

natural fertility

ease of cultivation

poaching

ease of drainage

Learning Outcome 5
Written Exercise.

For a given field or part of a farm, the student indicates the cropping limitations as a result of soil type, altitude, aspect, slope and climate.



BEST COPY